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Level of ict competencies at the university

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Abstract

The purpose of this study was to identify the level of ICT Competencies of university students from Mexico and Hungary. The research type is quantitative and exploratory. The instrument consists of 14 items. The sample was of 567 students. 302 students of Veracruzana University in Veracruz, Mexico. 265 students of Óbuda University in Budapest, Hungary. The situation of education in Hungary and Mexico is not so different although each country have taken different paths. The results referring of Hungarians and Mexicans Student´s perceptions about their competencies in ICT indicate that they express a high level of competencies in ICT.

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1. Introduction

International comparison analysis tool is an effective way to understand the situation between two or more different regions around the world. In this sense, the literature show the relevance to analyze how ITC is been used in education in order to get a deeper comprehension about the educational strategies, learning methods and pedagogical techniques more effective to be applied in the classroom.

For this reason, in this study we review the current situation of students in two universities. One is located in Óbuda University at Budapest, Hungary and the second one is Veracruzana University located in Veracruz, Mexico.

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In order to contextualize how ITC is been adopted in these two countries some data are presented in this document taken of international sources.

When The Global Information Technology Report (GITR) and the Networked Readiness Index (NRI) were created some 12 years ago, the attention of decision makers and investors was on adopting business and financial strategies that would allow them to develop in the context of a fast-moving but nascent Internet economy.

Over more than a decade, the NRI has provided decision makers with a useful conceptual framework to evaluate the impact of information and communication technologies (ICTs) at a global level, and to benchmark the ICT readiness and the usage of their economies.

According to the Networked Readiness Index (NRI) of 2013, Hungary was ranked in the 44 position with a score of 4.29. Meanwhile, Mexico was ranked in the 63 position with a score of 3.93. In we take in consideration the previous NRI report, it means 2012, Hungary descend one position in 2013, but Mexico increase 13 positions from 76 place in 2012 to 63 position in 2013.

Mexico experiences a sharp rise of 13 positions to attain 63rd place in the rankings, driven mainly by government efforts to deeply develop its offerings of online services (28th), increase its citizens' participation to support their government (25th), and an overall improvement in the business and innovation environment. Despite these important steps forward, the country has made less progress in further developing its ICT infrastructure (82nd) and significantly reducing its access costs (63rd), notably in terms of mobile telephony (102nd).

As a result, ICT uptake in terms of Internet users (78th) or households with Internet access has not progressed. This, coupled with a skills shortage (87th) because of the low quality of the educational system (100th), has resulted in little progress in terms of economic impacts accruing from ICTs (72nd). Adopting and implementing a holistic digital agenda that could boost the development and uptake of ICTs and their inclusion in a more robust innovation system could help address some of these important weaknesses and provide better results.

According to The Global Information Technology Report (2013), the situation of the countries in Central Europe - such as Hungary, Poland, and the Slovak Republic in 44th, 49th, and 61st place, respectively - have remained stable with little variation in the rankings, despite relatively well developed ICT infrastructures and penetration rates. However, serious weaknesses in their innovation systems hinder their capacity to properly integrate their digital development into a well-performing ecosystem that allows for higher innovation rates (Bilbao-Osorio, Dutta & Lanvin, 2013).

Therefore, the thematic of how ICT is been incorporated in Education remains as a pending point in many countries around the world. In this case some data corresponding to Hungarians and Mexicans students will be presented in this document in order to analyze what is happening in these countries.

2. Methodology

The purpose of this study was to identify the level of ICT competencies of university students from Mexico and Hungary. The research type is quantitative. The methodological strategy used was replication of the instruments used by one of the authors in another international research project where perceptions of teachers and students from two mexicans universities (Veracruzana University and Chihuahua Public University) and one spanish university (Salamanca University) were compared (García-Valcárcel y Arras, 2011). However, in this paper are showed the results of an exploratory study comprising just one dimension of the instruments that were applied: ICT competencies levels of students.

The instrument of ICT competencies levels of students is composed by 14 items. The reliability of the questionnaire obtained by the technique of Cronbach was 0.87. The design of the instrument included Likert scale with four categories: "None, Few, Quite and A lot". For purposes of this study it is assumed that students have a certain level of competency are shaped by the categories "Quite" and "A lot". Meanwhile, the absence or deficiency in competency categories is represented by "Nothing" and "Little".

The sample consisted of 567 students. Of which, 302 students belonged to the Bachelor of Administrative Computer Systems from Veracruzana University located in Veracruz City, Mexico. Also 265 students participated of

the Bachelor of Mechatronics at Óbuda University in Budapest, Hungary. Inclusion criteria of the sample were: (1) Public universities; (2) Students of careers related with systems; (3) Students close to graduation.

3. ICT Competencies

According to Llorente and Cabero (2005), the digital or technological literacy is presented today as an essential element for the education of university students which, when articulated in relation to the ICTs, involves the need of being knowledgeable in the use of new and old codes, symbolic systems and ways of interaction.

The development of these competencies appears as a paradigm in education and, to delve into the concept of competency, they provide a definition that describes competent persons are those who do very well what is expected from them in a given field. For Fuentes (2007: 53), competency is: A set of knowledge, skills, attitudes, and values that are needed to effectively perform an occupation or a productive role.

This definition involves observable behaviours that contribute to the successful completion of a task, and it implies knowing, knowing-how and knowing how to transfer that knowledge (Cárcamo and Muñoz, 2009). Linking this concept to ICT competencies, it can be said that the latter are a group of skills, knowledge and attitudes that are applied to the use of information and communication systems, as well as the devices that the activity involves and, according to *NETS for Students* (2007), also the knowledge that people should know and be able to learn and transfer, effectively, in order to live productively in a digital world.

These competencies are included in the educational standards that various countries have developed in the form of profiles, such as NETS (2007) in the United States, the Official certificate in Computing and Internet (B2i) in France, the incorporation of ICTs indicators in the National Curriculum in England, as well the transversal integration of the ICTs in schools, in Belgium (Llorente and Cabero, 2005).

It is important to note that all the previous standards describe key points of the educational development of ICT-literate students. NETS (2007) includes: the ability to make Web designs, presentations, databases, and the ability to use graphics software, spreadsheets, databases, online applications, e-mail, chat applications and word processors, among others. Moreover, UNESCO (2008) has presented the ICT competency standards for teachers, which combines the requirements for teachers and students in today's world and emphasises the current importance of ICTs for all countries, including the members of the OECD (Aypay, 2010).

Competencies in ICTs can be classified as: a) the core competencies of digital literacy, which are related to the use of ICTs in the classroom presentations and activities, and involve the use of digital tools to obtain information, and the use and development of materials obtained from various online sources; b) the implementation competencies, which are related to the use of skills and knowledge to create and manage complex projects, solve problems in real-world situations, collaborate with others, and make use of information and experts networks; c) the ethical competencies, which are related to the ethical, legal and responsible use of ICTs (UNESCO, 2008).

4. Results of the ICT Competencies Levels

In the table 2, we can check the average values in the competencies by university. Also we can check the results of the ANOVA test. According to the ANOVA test there are significant differences in at least 8 different items found.

Table 2. ANOVA test result of the Levels of Competencies

Item	Global Average	Veracruzana University Average	Óbuda University Average	Levene Statistic	Sig.
You use the main informatics and network resources.	2.82	3.02	2.58	18.826	0
You use the applications in a productive way.	2.74	2.86	2.6	0.065	0.798
You apply the digital tools to obtain information from varied sources.	3	3.02	2.97	7.677	0.006
You select, analyze, and makes an ethic use of the obtained information.	2.75	2.9	2.57	10.584	0.001

You communicate in an effective way the information and ideas, using a variety of media and formats.	2.73	2.67	2.8	2.916	0.088
You make use of models and simulations to explore complex topics.	2.29	2.46	2.11	5.967	0.015
You interact and collaborate with your partners, using a variety of digital resources.	2.84	2.71	2.99	10.885	0.001
You participate in groups that develop project for the production of original works or solve problems.	2.58	2.42	2.76	4.229	0.04
You solve problems, and make decisions using the appropriate tools and digital resources.	2.72	2.64	2.81	20.657	0
You plan and organize the required activities to solve a problem or make a project.	2.68	2.67	2.69	0.108	0.742
You create original works as a medium of personal expression.	2.38	2.66	2.06	11.077	0.001
You make a rational, legal and responsible use of the information through ICT	2.8	2.83	2.75	0.715	0.398
You value ICT as an instrument of permanent learning.	3.2	3.2	3.22	565	0.389
You value ICT as a medium of collaboration and social communication.	2.98	3.14	2.81	565	0.385

4.1. Differences in ICT Competencies

The differences found in the ANOVA test include the use of computer resource selection and ethical use of information obtained from the network, interaction with classmates through digital resources, problem solving through the use of digital tools and the creation of jobs as medium. In the rest of the items no relevant differences were found. Regarding the item "You use the main computer and networking resources" the global results indicate an acceptable level of competency reflected by 70.7% (57.6% "Quite" and "A lot" 13.1%). While reviewing the results by university, there are a trend mostly competent in the Mexicans students (81.1%) compared with the Hungarians students (58.8%).

In relation to the item "You apply the digital tools to obtain information from varied sources" we can see that in general results again the students are competent, shown by 81.8% (61.9% "Quite" and "A lot" 19.9%). Meanwhile the university results denote that there is a position mostly competent in Hungarians students (85.3%) compared with the Mexicans students (78.8%). Regarding the item "You select, analyze, and realize an ethic use of the obtained information" the results indicate an acceptable level of competence of 64.2% (51.3% "Quite" and 12.9% "A lot"). While observing the results by university shows a position further competent in Mexicans students (73.2%) in relation to the Hungarians students (54%).

About the sentence "You make use of models and simulations to explore complex topics" the global results show a perception of certain level of incompetent shown by 64.4 % (12.7 % "Nothing" and 51.7 % "A little"). Analyzing the results by university we can see a higher perception about the level of incompetent in the Hungarians students (72.1 %) in comparison with the Mexicans students (57.6%). Meanwhile in the item, "You interact and collaborate with your partners, using a variety of digital recourses" the global results show an acceptable level of competency shown by 69.5% ("Quite" 49.6% and "A lot" 19.9%). While reviewing the results by university is shown a position mostly competent in Hungarians students (79.2%) compared with the Mexicans students (60.9%).

Referring to the sentence "You participate in groups that develop project for the production of original works or solve problems" the global results denote an acceptable level of competency given by 54.1% (43.2% "Quite" and "A lot" 11.0%). While the university results, show a disparity in trends, because while Hungarians students indicate themselves as competent (65.3%), Mexicans mostly have a level of no competency (55.7%). Moreover for the item "You solve problems, and make decisions using the appropriate tools and digital resources" global results show an acceptable level of competency reflected by 64.7% (52.7% "Quite" and "A lot" 12.0%). The university results marked a higher level of competency in Hungarians students (72.1%) compared with Mexicans students (58.3%).

In the sentence "You create original works as a medium of personal expression" the global results indicate mostly a level of low competency, denoted by 58% (46.4% "A Little" and 11.6% "Nothing"). While in the results at the

university level, there is a perception of low competency in the Hungarians students (74.3%) and a trend in their perception about certain competency in Mexicans students (56.3%).

4.2. Similitudes in ICT Competencies

Meanwhile, we found that six items are not significantly different. Regarding the item "You use the applications in a productive way" the global results indicate a level of competency indicated by 66.7% (56.5% "Quite" and "A lot" 10.2%). Considering the results of Veracruzana University and Óbuda University, we found a similar level of competency in Mexicans students (70.8%) in relation with the Hungarians students (61.9%). For the sentence "You communicate in an effective way the information and ideas, using a variety of media and formats" global results mark an acceptable level of competency given by 64% (52.9% "Quite" and "A lot" 11.1%). While, observing the percentages by university, there is a small higher difference in the level of competency in Hungarians students (68.7 %) against the Mexicans students (59.9%).

In relation to the item "You plan and organize the required activities to solve a problem or make a project" the global results have a permissible level of competency denoted by 59.6% (47.4% "Quite" and 12.2% "A lot"). The results by country show a higher level of competency in Hungarians students (60.4%) in relation with the Mexicans (59.6%). Regarding to the item "You make a rational, legal and responsible use of the information through the ICT" global results indicate a higher level of competency given by 70.7% (58.7% "Very much" and 12% “Quite "). While observing the results by the origin of the students, there is a slightly higher level of competency in the Mexicans students (71.9%) compared with the Hungarians students (69.4%).

For the phrase "You value the ICT as an instrument of permanent learning" the global results show mostly a level of competency given by 87.4% (53.4% "Quite" and 34% "A lot"). Meanwhile, checking the results of Veracruzana University and Óbuda University, we found that there is a level of competency almost equal among Hungarians students (87.6 %) and Mexicans students (87.4%). Finally, for the sentence "You value ICT as a medium of social communication and collaboration" global results indicate an acceptable level of competency shown by 78 % (54% "Quite" and 24 % "A lot"). While observing the results by the origin of the students mostly they reflect a higher level of competency in Mexicans students (82.8 %) compared with Hungarians students (72.5%).

5. Conclusions

The results referring of Hungarians and Mexicans Student´s perceptions about their competencies in ICT indicate that they express a high level of competencies in ICT. The students got a high level of competency to the use of ICT as a permanent means of learning and as a means of social communication. The student indicated to make productive use of the various applications that are offered. The main use is given to these tools is as a means of obtaining information, and they say they make a legal and responsible use. These results suggest the need to develop strategies that promote the effective use of technology resources in students and teachers.

As for differences by university (Veracruzana and Óbuda) percentages indicate that there are higher levels of competencies in the Mexicans students. The most significant differences are presented in the preference to work with colleagues who use computer media, this may be, in the case of Mexicans students because there boredom for this type of activity, lack of communication or a grade of mistrust on the commitment or ability of their classmates. So, the Mexicans choose to perform activities in individually way, without having to go through a process of collaborative work. While, the Hungarians students prefer the teamwork over the individual work.

Finally, it is important to continue working with comparative analysis in order to detect what is happening in the universities around the world in order to make proposals of incorporation of ITC in education based in the best practices in teaching and get a better understanding about the actors (teachers and students) who participate in this educational process.

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